METHOD FOR OPTIMIZING A MULTIVARIATE ALLOCATION OF RESOURCES

ABSTRACT OF THE DISCLOSURE

A method for providing for an efficient unconstrained and nonlinear constrained optimization solution to the multivariate allocation of resources to meet manufacturing needs for uncertain multiproduct demand, where uncertainty is captured through a multivariate normal distribution over product demand (or more generally, any member of the elliptical family of distributions). A series of products (or refinements) is arranged in a product space plan according to connectivities between the products and associated components (or resources) which might go to make up the product. An expected value function is derived for the plan, and is thereafter converted into a closed form expression. The product space plan is transformed into a working space plan having corresponding elements for each product, the transformation process using for instance an inverse Cholesky transformation. A loading step is applied to the working space plan wherein each element is sequentially analyzed to determine if an associated component gates production of that product. Each element is loaded accordingly, with components being unloaded from prior elements if a subsequent element is gated. A reloading step is thereafter applied which redetermines if any elements are gated by a component that might have been unloaded from the element. If the element is still gated, then the elements which share the component are merged into a sub-plan, which can be maximized as a function of a single variable. The resulting sub-plans (or blocks) represent an equilibrium configuration with parts that can each be maximized over a single variable. These maximizations can thereafter be used to find the optimum level of components to produce the maximum level of products.